AN Anatomical Account OF THE ELEPHANT Accidentally Burnt in DUBLIN, ON *Fryday, June* 17. in the Year 1681.

Sent in a LETTER

To Sir *WILL. PETTY*,

FELLOW OF

The Royal Society.

TOGETHER

With a Relation of new Anatomical Observations in the Eyes of Animals: Communicated in another LETTER to the Honourable *R. Boyle*, Esq; FELLOW of the same SOCIETY.

By A. M. Med. *of* Trinity *Colledge near* Dublin.

London, Printed for *Sam. Smith*, Bookseller, at the *Prince's Arms* in St. *Paul's Church-Yard*. 1682.

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Honoured Sir,

MY Ambition to ſerve the R. S. in general, & my Obligations to your ſelf in particular, are the only Motives that induce me to communicate my Obſervations on the Elephant burned here laſt Summer; for I underſtand that they are likely to be made publick, and am very unwilling to appear in Print, eſpecially at the diſadvantages which now I muſt: For People admiring the Elephant, as well for his docility, as bulk, and rareneſs in theſe Countries, will expect ſo curious an account of him, as may furniſh them with the Reaſons, why he comes to be more capable of doing things which ſeem to require Ratiocination, than any other Brute that we know. They may moreover think that from an exact deſcription of the ſeveral parts of his Body, moſt, if not all Veſſels and Organs being larger conſiderably in him,

than in other Creatures, a great light into the true uſes of parts might be had.

Now Sir, I muſt deſire you to inform that Honourable Society, for whom you deſign theſe following Notes, and of whom you are a Member, with the Reaſons why I cannot anſwer ſuch great expectations. My want of Optick Glaſſes, and of other helps for curious Obſervations were conſiderable.

Moreover the Circumſtances of time and place were unfortunate; for the Booth wherein the Elephant was kept, took fire about Three a Clock in the morning, on *Friday* the 17th of *June*; upon this the City being alarm'd, multitudes were gathered about the place: And when the fire was extinguiſhed every one endeavoured to procure ſome part of the Elephant, few of them having ſeen him living, by reaſon of the great rates put upon the ſight of him. To prevent his being taken away by the multitude, the Manager, Mr. *Wilkins*, procured a File of Muſqueteers to guard him, till he ſhould build a ſhed where he might ſecurely disjoint him, in order to the making of a Skeleton: This he got finiſhed at Seven a Clock at Night, and about Eight I heard of his deſign. Being deſirous to inform my ſelf in the ſtructure of the Elephant, I made ſearch for him, and having found

found him I proffered my ſervice to him; of which when he accepted, I endeavoured to perſuade him to diſcharge ſome Butchers which he had in a readineſs to order the Elephant after their way, and to leave the whole management of the matter to me, and to ſuch as I thought fit to employ, deſigning a general diſſection, and that the *Icons* of each part ſhould be taken in order by ſome Painters, with whom upon this occaſion I could prevail: But my endeavours prov'd fruitleſs, becauſe that about Ten a Clock that night, when we went to the ſhed, to find what condition the Elephant was in, he emicted very noiſom ſteams. Theſe made the Manager fear (the ſhed being very near the Council-Chamber, and the Cuſtom-Houſe,) that the Ld. Lt. or Ld. Mayor would order it to be taken away as a nuyſance, and that ſo in all probability it ſhould be loſt, and that perhaps he himſelf ſhould be puniſhed for ſuffering it to be there. When I conſidered, that in caſe he did not diſpoſe of him that Night, the next Day being *Saturday*, I ſhould be able to accompliſh but a ſmall part of what I deſigned, and that it would be both chargeable and difficult to preſerve him from the rabble till *Monday*, and that then the ſtink would be altogether intolerable, if it ſhould encreaſe in proportion to what it had done that day. I conſented to

have

have the buſineſs done that night, and for expeditions ſake, to make uſe of the Butchers as Aſſiſtants, but ſo as to be directed by my ſelf in every thing: But their forwardneſs to cut and ſlaſh what came firſt in their way, and their unruſineſs withal did hinder me from making ſeveral Remarks which otherwiſe I would have made: Thus the Elephant was disjointed by Candle-light. Some parts were burnt, moſt of thoſe that were not, were more or leſs defac'd by being parboiled. This may ſatisfie the R. S. how difficult it was to give a ſatisfactory Anatomical Account of the Elephant, and that the following ſlender one is given to ſhew my readineſs to ſerve them, and my Obedience to your Commands.

I ſhall not trouble you with a Repetition of what has been ſaid of the Elephant by *Pliny*, *Geſner*, *Tavernier*, and others, being very little, if any way, inſtructive to any deſirous to underſtand the Anatomy of that Creature, but ſhall faithfully, and as plainly as I can, acquaint you with what occurred remarkable to me, upon a view of the ſeveral parts of his Body, and ſhall add only ſome conjectures of my own concerning the uſes of ſome parts derived from their ſtructure.

Cuticula. I ſhall begin with the *Cuticula*, (of which I keep a piece which was raiſed by the Fire from a part of the

the *Cutis*, on which the Elephant was found lying, and which therefore was not defac'd) when I examined this, I found it covered all over with a ſtrange ſort of Scab, in many places reſembling old Warts, deeply jagg'd, and the carnous Fibres of the Muſcles of Beef, when much boiled, and tranſverſly cut, but of a dirty tawny Colour. Theſe Scabs (if I may ſo call them) both ſlit and cut, lookt like ſhort pieces of Whalebone. They did ſo firmly ſtick to the *Cuticula*, that I could not pull them from it, nor the parts of which they conſiſted (though they were much divided) from one another, without tearing it. And yet the *Cuticula* was much tougher and thicker than any that I have ſeen.

The length of theſe Scabs was in ſome $\frac{1}{3}$ or $\frac{1}{4}$ but in other places not above $\frac{1}{10}$ or $\frac{1}{12}$ of an Inch. The cauſe of which difference I take to be the Elephants wearing, by rubbing or lying, ſome parts of them, whilſt others were ſlightly or not at all worn.

I could find but very few Hairs without this ſcab, but many within, and even with it. The Elephants inclinations to Itch, and to rub himſelf againſt whatever came in his way, kept thoſe Hairs that were even with the outſide of the aforeſaid ſcab, from appearing of any conſiderable length. The hard-

neſs

neſs of the ſcab by keeping the Roots of the Hairs faſt, did very much contribute to their wearing on the outſide, as well as to their preſervation on that within. The length of the Hairs for the moſt part was equal to that of the Scabs.

The Hair. The Hair in the *Cutis*, when diveſted of its *Cuticula*, were numerous, and many of them were conſiderably ſtiffer and thicker than the briſtles of a Hog. They were black, and as many as were found in the *Cuticula*, when ſeparated from the *Cutis*, were plainly covered over with thin Membranes, from the extremity of the Roots to the *Cuticula*. Theſe (with ſubmiſſion to better Judgment) I take to be the linings to peculiar *ductus*, which by the heat of the Fire were ſeparated from them, as the *Cuticula* was from the *Cutis*. In theſe *ductus* the Hairs were manifeſtly planted. Now ſeeing that cloſe about the Roots of Hairs, as well as on the Pores, near which there is no Hair, a dew may be diſcerned ſoon after ſweat is wiped away. I take it to be reaſonable to think, that there are two ſorts of Pores in the skins of Animals. One ſmall, deſigned altogether for the ſeparation of ſuch Liquors and Vapours, as are uſually thrown off by inſenſible Perſpiration and Sweat. The other to contain and nouriſh Hairs; for at the bottom of each of theſe *ductus* there appeared to the naked Eye

ſmall

ſmall Glandules when the Skin was divided to the extremity of the roots. Theſe I ſuppoſe to be the *glandulæ miliares*, obſerv'd by the moſt accurate Anatomiſts, *Segnior Malphigi*, and Dr. *Steno*, in their ſtructure of the *Cutis*. Theſe probably ſeparate from the maſs of Blood an excrementitious matter, fit for the nouriſhment of the Hairs, and what is not ſpent in that, is (I ſuppoſe) caſt out between the Hairs and the aforementioned thin Membranes, which, upon that account, may be properly called Lymphæducts; and ſo likewiſe may the ſmaller ſort, (of which more anon) and each of them a proper *Vas excretorium* to a *Glandula Miliaris*.

The Hairs which came out of the Skin, and which were in the *Cuticula*, were from the end of the root to the *Cuticula* in length between $\frac{1}{4}$ and $\frac{1}{3}$ of an Inch.

The outward *ſuperficies* of the *Cutis*, freed from the *Cuticula*, was very uneven, by reaſon of a vaſt number of Pyramidal *papillæ*, about the bigneſs of ſmall Pins heads: To fit each of theſe there were cavities in the *Cuticula*. Theſe *papillæ* were probably pores, being to the ſight like thoſe that a ſudden Cold produces in our Skins, and which unqueſtionably are ſuch. *Cutis.*

Now if it be granted, that in Brutes there is an inſenſible Perſpiration (which all rational men

that ſees them ſweat will allow; foraſmuch as what is by that caſt off, is not ſo groſs a Body as Sweat,) and if their inſenſible diſcharge be granted proportionable to that of a man; it will follow, that the Elephant being a Creature of extraordinary bulk, muſt have very many pores, and very large ones too, ſuch as may be diſcerned by the naked Eye, when we find them to be ſo even in Men, in the Palms eſpecially of the Hands, and in them all other Veſſels are proportionably leſs than they were in the Elephant. *I* ſay, that the pores muſt be both numerous and large, for the uſe aforeſaid, eſpecially if we may confide in *Sanctorius* his *Statical Obſervations* of a mans inſenſibly perſpiring in a Winters day 50 Ounces, and upwards, which is ſomwhat more than a 54th part of an ordinary mans weight, which *I* take to be about 170 *l.* (and upon ſuch meaning himſelf, *I* ſuppoſe him to have made his Experiments,) and allow the Elephant to perſpire proportionably, we will find that his daily inſenſible evacuation will amount to very near 93 *l.* if we may believe ſome that has ſeen the Elephant put on Shipboard, and taken off, that ſaid he weighed 2½ Tuns or 5000 *l.* of which 93 *l.* is about a 54th part. Though *I* am not forward to believe, what *I* have at ſeveral times been told, as to his weight, nor aſſured that his Tranſpiration was proportio-

portionable to that of a man, becauſe of the outward ſcab, which might bar it; yet that he did much tranſpire *I* believe, from the vivacity of his *ſpecies*, and have together with many Arguments for perſpiration in general, one in particular to alledge for the great neceſſity of it in this Animal, and that is this, his blood and fleſh did extraordinarily abound with an urinous Salt, which made the maſs of humours extraordinary active, and conſequently capable of making their way through the ſmalleſt paſſages, the pungency of the Salt not a little irritating the pores to an excretion. I ſuppoſe moreover that this Salt ought to be neceſſarily and continually caſt off with ſeroſities, to prevent diſeaſes conſequent to too great a quantity of *Volatile Salt* in the Body. Why the exorbitancy of this ſort of Salt, as well as that of a fixed *Marine Salt* in *Scorbutick* Perſons, ſhould not cauſe many diſtempers, (though few of ſuch may be known to the Inhabitants of our cold Climates,) I cannot gueſs; but that he did ſo abound in an Urinous Salt, did appear not only from the urinous *effluvia* which ſo affected my Noſtrils that I was ſcarce able to endure them; but alſo from the ſmarting which his blood occaſioned, (contrary to what I ever obſerv'd in that of other Creatures) lighting on a cutt which I accidentally at that time receiv'd in one of my Fingers. The difference be-

tween the pungency of the Salt in this Blood, and that in ſtale Urine was ſuch, that the latter uſually in a little time ceaſes to ſtimulate a tender part kept ſteept in it, whereas the former did make my Finger all that night, and the next day whilſt embrued in it continually ſmart. But more eſpecially it appeared from the taſt of his Fleſh when dreſſed on the Coals, before a fire, or fri'd, (boiling in Water took it clear away) which was, as near as I can gueſs, like that of lean Beef ſeaſon'd with Salt of Hartshorn.

It is not only probable therefore that the Elephant did inſenſibly perſpire much, but alſo that thoſe Pyramidal *Papillæ* were the paſſages through which he did tranſpire, nothing except them and the places of the Hairs appearing any way like pores.

Cutis ſubſtantia. When the *Cutis* was cut through, as far commonly as the roots of the Hairs reach'd, it was like the callous or horny part of Brawn; but the inner part was very glandulous with a little fat interſpers'd.

Craſſities cutis. The *Cutis* before it dried was in ſome places 1¼ Inch thick, and in other places not above an Inch, and in others ſomwhat leſs.

I could find no cutaneous Veſſel of any remarkable bigneſs, and but very few ſmall ones.

Panniculus carnoſus deſuit. *I* made ſearch for the *Panniculus carnoſus*, but found none. *I* was the more diligent in my ſearch for it, becauſe that *I* underſtood it was uſual with the

the Elephant to kill the Flies which lighted on the cracks in his Skin, and tormented him; and this he did by bringing the ſides of the cracks cloſe together of a ſudden, which *I* thought to be performed by that cutaneous Muſcle, meaning the aforeſaid *Panniculus carnoſus*, but nothing like it appearing, *I* concluded that what *I* ſuppoſed ought to have been done by that Muſcle, was in this Animal done by putting himſelf ſuddenly in a poſture to wrinkle the skin of that ſide that was attack'd by the Flies, and this to be done by bending his body that way, by which means what was before ſtreight for him, being now too full, the ſides of the cracks were forced cloſe together, & thus the Flies were bruis'd.

Defuit & Membrana adipoſa.

There was no *Membrana adipoſa* to be ſeen about him, neither was there inwardly or outwardly, except a little in the *Perineum*, any appearance of fat; but inſtead of the two laſt mentioned integuments, there was a very ſtrong nervous Membrane, obliquely deſcending from the *Spinæ dorſi* to the *Sternum*, and the *linea alba*. This Membrane was very tough, and very near as hard to be cut as Whalebone of the ſame thickneſs; which all along the back-bone was about $\frac{1}{7}$ of an *I*nch; but the nearer the end *I* tried it the thinner *I* found it. This Membrane ſeem'd to terminate in the *linea alba*, as the tendons of the Muſcles of the *abdomen* uſually do.

Membrana nervoſa.

The

The nervous Fibres of which this Membrane was made, were very diſtinguiſhable, and might eaſily be ſeparated for their whole length. *I* have nothing to ſay as to its Origin, unleſs it proceeded from the *dura Mater*. This doubtleſs was deſign'd to ſtrengthen this Creature, and perhaps that the weight of the *Viſcera* contain'd in the *Abdomen*, ſhould not diſtend the *Peritoneum*, and the Muſcles adjoining, ſo as to let them hang lower than was convenient.

The Taxwax. The Ligament, commonly call'd Taxwax, reach'd from the Head, to which it grew, to about the 13th *vertebra* of the *dorſum*; it was double, one on each ſide of the *Spinæ vertebrarum colli & dorſi*; it was both very thick, and very broad, and conſequently very ſtrong; its uſe doubtleſs was to aſſiſt the Muſcles and other parts of the Neck, to bear the extraordinary weight of the Head, being placed not flat, but edgewiſe, like Planks uſed as Joices to bear up Floors. And this piece of Architecture is found in moſt, if not all Quadruped's, for the very ſame purpoſe; but being needleſs, it's wanting in men.

I made no other Remark on the Muſcles, but that they were very large, and conſiſted of Fibres much thicker than thoſe of Beef.

Muſculi duo Retractores Penis. In ſearching for the *Teſtes*, I found Muſcles ſo like them, that I doubted not but that they were the very *Teſtes*; their ſhape did moſt exactly reſemble them;

them: and their tendons, before the *Teſtes* are taken out of the *Proceſſus* of the *Peritoneum*, might paſs for the ſeminary Veſſels; nothing by Candle-light, but an examination of them by diſſection, could have undeceived me. I was very deſirous to ſee the Anatomy of one of them, and did what I could to inform my ſelf that way, by which means I diſcovered my Errour, and having found two Muſcles unlike any that ever I ſaw, I trac'd them to the inner and lower ſide of the *Os Iſchion*; where I found them implanted; I traced the tendons likewiſe, and found that when they had gone ſingly near upon 4 Inches, that they joined in one, which went directly under the middle of the *Penis*, and reach'd beyond a crookedneſs that *I* obſerved in it: this was in length about 8 Inches, it was then within 6 or 7 Inches of the *Glans* terminated: having expanded itſelf into a Membrane.

There was, beſides theſe, a nervous Body that began underneath, near the aforeſaid tendons, about 8 Inches from the root of the *Penis*, and reached (diſtinct from the Yard) 9 Inches, before it was inſerted again in it, at a place 5½ Inches from the *Glans*.

When I conſidered that the Actions of all Muſcles were, by a Swelling and a Contraction of their Fibres, *I* was of opinion on the account of thoſe Muſcles, and of that nervous Body ſo conveniently *Eorum uſus.*

niently plac'd for that purpoſe, that the Elephant was a Retromingent, and very probably a Retrocoient Animal. The crookedneſs and bending downwards, which I obſerved in the *Penis*, ſomwhat ſhort of the end of the Tendon confirm'd me in that Opinion, & laſtly the confeſſion of thoſe that were his conſtant Attendants, put the buſineſs out of doubt; for they ſaid, that whenſoever the Elephant would make water, they obſerv'd him unſheath his *Penis*, and turn it backwards, and ſo piſs between his hind Legs outwards. Here nature manifeſted her care in making a peculiar proviſion for this unweildy *Animal* to prevent his wallowing in his own Excrements.

After this, and a long ſearch, I found the *Teſtes* which were not contain'd in a *Scrotum* or *Capſula*, but lay in the *Perineum*, cloſe joined on each ſide to the *Penis*; they were neither of the uſual ſhape, bigneſs, nor included in a *proceſſus* of ꝯ *Peritoneum*. Their ſhape was very like that of a Cheſnut; they were thicker on the ſide that grew to the *Penis* than on the oppoſite. They were flat & round. They were not ſutable to the other parts of his Body; for if I had the curioſity to weigh them, I believe that both ſhould be found to weigh but little more than 3, or at moſt 4 ounces. They were join'd to the *Penis* by a great many, at leaſt 100 ſeminal *Tubes*, which may be properly call'd

call'd *Vaſa deferentia*, & which depoſited the elaborated *Semen* in ſeveral Rhomboid Cells, plac'd in the body of the *Penis*, which in this Creature was the common and only repoſitory for the ſeed that I could find. Theſe Cells were turgid with Sperm, and ſo were the *Tubes*; the latter were larger than any that ever I ſaw, in the *Teſtes* of other Animals; moſt of them without any force receiving a Block Tin Wire of equal thickneſs with the biggeſt of the ordinary Pins; and this they received for an Inch, and ſometimes more, when the *Tube* was ſtreight, as moſt of them were; but when I followed them further into the Body of the *Teſtis*, they became ſenſibly ſmaller & ſmaller till they diſappear'd.

I ſearch'd for that which Dr. *Highmor* calls a *Ductus*, and *DeGraafe* more truly makes the *Stabilimentum* to the Veſſels in the *Teſtes* both Blood and Seminary; but could not clearly ſee it. The blood Veſſels came into the *Teſtes* by the *Vaſa deferentia*.

Though theſe were ſmall and diſproportionable, yet I took them to be the *Teſtes*, nothing elſe outwardly appearing that contain'd Seminary Veſſels, till I underſtood by the curious Anatomiſt and learned Phyſician Dr. *Needham*, that my deſcription of the Teſticles of the Elephant did agree to the *Proſtatæ* of a Boar; upon which I concluded that I miſtook the *Teſtes* for the *Proſtatæ*, there being a great reſemblance between theſe Animals, and having found Two Subſtances (of which more anon) between the Kidneys and the neck of the

Bladder, which might very well be *Teſtes*, and which, till *I* diſcours'd that ingenious Gentleman *I* did not well know what to make of.

I ſhall, when *I* come to the inward parts, ſay ſomthing of the *vaſa præparantia*.

The *vagina* for the *Penis* was, at the opening, horny, and was ſhut up ſo cloſe, that there was not room for a mans little finger to get in. We could not, without dividing it, come at the Yard.

is. The *Penis* look'd more inconſiderable by being ſo cloſely ſhut up, than it did when freed from the Sheath; it was larger than that of a Stone-Horſe, but hardly ſo long.

ethra. The *Urethra* was large, for it admitted a round ſtick, near as thick as a mans Finger, which was thruſt into it to ſtreighten it.

ritone- The *Peritoneum* was a very tough, thick, white *.* Membrane, much wrinkled, that might be divided into many, though not diſtinct, Membranes.

ment. The *Omentum* was nothing but a very thin and double Membrane, together with a net of ſmall blood-veſſels, accompanied with ſmall threads of Fat; its inſertions were as uſually they are in other *Animals*.

ntricu- The *Ventricle* was in length 4 foot, and about 3 *lus.* inches, it was round about 3½ Foot. The *Æſophagus* was not inſerted in the extremity of it, as in Men, Dogs, and many other *Animals*, but a Foot from that, towards the middle of it, in which (if I miſtake not) it agrees with

with the Stomach of a Horſe. There was but one, contrary to what ſome did imagine, if we do not reckon the *Cæcum* and the *Colon* for two. I found ſeveral peble ſtones in it, whereof ſome were large, which if weighed, would be found to be between 3 and 4 ounces. By their colour and ſhapes I ſhould gueſs them to be taken, not long before, from ſome Sea ſhore. They were ſwallowed, I ſuppoſe, to cleanſe the Stomach & Guts. I did not find any thing elſe remarkable in the Stomach, its ſhape, Coats and Fibres agreeing in other things, with that of Men, Dogs, *&c.*

The *Inteſtina tenuia* were burnt in many places, but not quite through any where, excepting two or three. *Inteſtina tenuia.*

The *Ileum* and *Jejunum* were not extraordinary big, but were in length about 52 Foot. *Ileum. Jejunum*

The length of that which is commonly call'd the *Duodenum*, was about 4½ Foot. *Duodenum*

The *Cæcum* was very large and diſtended with hard dung; its Coats were thicker, and its Fibres were ſtronger than thoſe of the Stomack. The thickneſs of the Fibres vvas very diſcernable vvhere a part of this Gut vvas burnt. The length of this Gut vvas about 20 inches, but its meaſure round about vvas about 2½ foot. *Cæcum.*

The *Colon* vvas monſtrouſly big, for it vvas in ſome places upvvards of 3½ Foot round, and in others it vvanted ſomvvhat of 3 Foot; its length vvas to an inconſiderable matter, 15 Foot, though I ſearched diligenly for the *Valvula coli*, I could perceive nothing of it. *Colon.*

ctum. The *Rectum* (by which I mean the remainder of the *Inteſtina craſſa*, (though a part of them could not be properly ſo called) becauſe of the equality for the moſt part of their Diameters, and diſproportion to the *Colon*, and of my want of a name for a new Gut.) was about 4 Foot in length; and ſo the whole length of the Guts was about 75 Foot, or 25 Yards.

brarum ſiculus There was a *Faſciculus* of ſtreight Fibres, near as thick, and altogether as broad as a mans middle Finger; this (to the beſt of my remembrance) began at the *Cœcum* and reach'd to the *Anus*. This was oppoſite to the Meſentery, and was, I ſuppoſe, deſign'd upon occaſion to ſhorten that ſide of the Guts, as the Meſentery did the oppoſite; that ſo the *Periſtaltick motion* of the Guts might be more equal, and conſequently, that the Excrements might be the more eaſily protruded, the paſſage being more direct; and alſo that their propulſion might be in leſs time, becauſe that the journey is thereby ſhortened.

The Fibres of the Guts, both ſtreight and ſpiral (for ſo they ſeem'd to be, and not truly circular) were very ſtrong and thick.

There were many large Veins in the Guts, and between the inner *Tunica* (which by the bye was very *glandulous* and thick) and the third, or that next it, there was a curious *Plexus retiformis* of Blood-veſſels.

Meſentery. The *Meſentery* was very ſtrong, being very thick, it had no fat about it, neither was there any relique of it.

The

The *Meſaraick Veins* were very large, many of them equalling, and ſome exceeding in bigneſs the *Vena cava* of a Maſtiff Dog. I do not remember to have ſeen any remarkable *Glandule* in it. *Vena meſaraica.*

The Liver was very large, and conſiſted of 2 *Lobes* only, each long, round, and a little flattiſh. The *Fiſſure* which made thoſe *Lobes* reach'd $\frac{2}{3}$ of the length of the Liver. I found the Stomach plac'd between theſe two, one lay upon it, and the other lay between it and the *vertebræ* of the back, like a bolſter: Whether this was the natural place of the Stomach, or put there by the Elephants ſtrugling to get looſe to avoid the fire, I will leave to you to determine. *Hepar.*

The Membrane that inveſted the Liver was rais'd from it for a conſiderable way, as if it ne'er had been join'd to it; though this Membrane ſeem'd to be whole, and look'd like the *Cuticula* raiſed by a bliſtering Plaiſter, yet there was no *ſerum* contained in it; and where it ſeemed to be intimately join'd to the Liver, by a gentle pull it came off, without tearing any thing that I could take notice of, as if it had been but very ſlightly faſtened to the Liver, or rather a bag which contain'd it, and exactly fitted it: But for all this I cannot but think that this Membrane, as well as every one, which immediately includes any of the *Viſcera* have beſides other uſes, this one; namely to terminate and ſhut the capillary veſſels; ſo to prevent a gleeting of ſerous humours, which would inevitably follow, and which *Membrana hepar inveſtiens*

which would ſoon ulcerate as well the adjacent, as the part itſelf, and we find that Nature does moſt commonly obviate ſuch inconveniences; therefore I muſt wholly impute the clear in ſome places, and in others that eaſie ſeparation of the Membrane from the Liver, tothe fire.

The *Bilis* was depoſited at the end of the firſt Gut, improperly call'd the *Duodenum* in this Creature, that is 4½ Foot below the *Pilorus*, from which place I trac'd the *ductus communis* to the Liver, to ſee the *veſica fellea*, but it was wanting, and in the place of it I found the *Porus Biliarius* come out of the Liver, as the *Ductus hepaticus* uſually does. I obſerv'd likewiſe (which before I have done in other Creatures) that the *Bilis* found in that, differed both in colour and conſiſtency from that which I found in the *Ductus Hepaticus*; for the latter was a clear light yellow, and was congeal'd with all like a Jelly; whereas that of the former was of a dark green; and was ſomwhat more fluid than the Gall of an Ox. That there is this difference in the Galls of moſt *Animals*, is a thing that I believe time will diſcover, which then will excite diſcerning men to find out their different uſes. I could find nothing peculiarly remarkable in the ſubſtance of the Liver by cutting, only that it was manifeſtly glandulous, as the ſagacious *Malphigi* obſerved.

The *Pancreas* was very long, and large; for it reacht from about the middle of the Stomach to the *Jejunum*, which

which ſpace could not be leſs than 6½ Foot: it was a *Glandula conglomerata* as the *Pancreas* always is, and had its *ductus* ſo wide, that it could without force contain my little Finger; it opened into the Gut where the *ductus felleus* did: Whether both the paſſages join'd in one before their aperture into the Inteſtine or no, is a thing that I forgot.

I found a *Succus* in the *ductus*, not limpid as uſually it appears, but of a very dark green colour, and yet very fluid, ſeeming to contain no viſcid Phlegm. I wanted the curioſity to taſte it. *Ejuſdem ductus.*

The Spleen was between 3 and 4 Inches in breadth, and in length 4 Foot, and ſomwhat more; it was very glandulous, agreeable to the ſame *Malphigi*'s Obſervations in his Book *De Viſcerum ſtructura.* I ſaw nothing elſe in it that deſerv'd particular notice to be taken of it. *Lien.*

The *Renes ſuccenturiati*, or *Glandulæ renales*, were placed in this, as in other *Animals*, but they differed in their length (which was about 3 inches) from that of other Creatures; they were hollow, and contained an ill coloured blackiſh blood, for which, I ſuppoſe, they are called *Capſulæ atrabiliariæ*; they were thicker than a Mans Thumb. *Glandu renales.*

The Kidneys lay, in a hollow exactly fitting them, in the Loins, and could hardly be diſcerned, though each of them was little leſs than a Childs Liver. Their Figure was Oval; they were included in a very ſtrong *Renes.*

Mem-

Membrane, vvhich vvas faſtened to them in no place, but at the emulgent Veſſels. When this was taken off, each of the Kidneys was found to conſiſt of ſix *Lobes*. The Cavity uſually found in other Kidneys, called the *Pelvis*, here was wanting.

I found the *Ureter* divided into 6 parts, one for each Lobe, each of them (as near as I can gueſs) of equal Diameter with the *Ureter* itſelf. Theſe went into their reſpective Lobes, about an inch before their arterial ſubſtance terminated.

There were no *Caruncul æ Papillares*, neither could I find any thing that made the manner of ſeparating the Urine, more intelligible than formerly it was.

The *Ureter* was no wider than that of an Ox; it had nothing peculiarly remarkable, except its diſproportion to moſt of the other parts of the Body.

The *Veſica Urinaria* was much of the ſame ſize with an Oxes Bladder, but much ſtronger, having thicker Fibres.

The *Venæ præparantes* were large. I divided that which was inſerted into the emulgent, lengthwiſe; and, within a little more than an inch to its inſertion, I found many *valves*, I gueſs about Eight or Ten, theſe were of divers ſhapes, all fitted to hinder the return of the Blood into the variouſly divided Spermatick Vein; which here from Eight or Ten Rivulets became one great Channel.

Within

Within about an inch of this, and ſomewhat more than two of the Kidneys, I found a ſubſtance of the ſhape of a Pear; but near three times as big as the largeſt Pear ever I ſaw. I did what I could by different ways of diſſection to find out what manner of thing this was, which was altogether ſtrange for ought I knew; but after all can give but a very imperfect account of it; for the Butchers very unluckily did cut it out, and ſoe its communications with the teſtes, the penis and other parts could not be diſcovered.

What I obſerv'd in it is this, the Spermatick Veſſels at firſt entred but a little way into this ſubſtance, but below the middle on't I found them more deeply plac'd, and their Branches grow ſmall and leſs numerous to the right, as if here the Veins began. (By the bye I take the beginning of Veins to be from the extream Parts, as that of the Arteries is from the Heart.) The inward Parts of this Subſtance look'd of a paliſh, but ſomewhat muddy red Colour. It was very ſpungy, not much more compact than the Lungs of young Animals. I doubt not but this Subſtance was deſign'd to prepare the Semen.

But by what Veſſels it was brought to the *Penis*, or to any repoſitory (It ſelf containing none) I could not diſcover for the reaſons above mentioned. Neither could I find any peculiar Veſſel, or *Ductus*, or any thing that reſembled one in that aforementioned Subſtance by which I might be directed in my enquiry. It lay lengthways from the Kidneys to the *Teſtes*, with the biggeſt end loweſt. I was ſo intent upon a ſearch for ſome peculiar *Ductus* in this Part, that I clearly forgot to take notice of the *Arteriæ Præparantes*; from what I heard the moſt accurate Anatomiſt, Dr. *Needham*, ſay of the *partes generationi inſervientes*, in general, and particularly of thoſe of a Boar; I doubt not but that theſe two Pears faſhion'd now deſcrib'd Subſtances were *Teſtes*; their place, ſize, figure, together with the want of the *vaſa deferentia*, occaſion'd by the Butchers unadviſed cutting them out, were the cauſes of my ignorance heretofore in this point.

I had the *Penis* cut out, with its aprendices, as carefully as I could, and yet I ſaw no *veſiculæ ſeminales*, nor any other common receptacle for the *Semen*, except the formerly mention'd Rhomboide Cells obſerv'd in the

Veſiculæ ſeminales.

the ſides of the *Penis* it ſelf. But after all this I cannot but ſuſpect my own unwarineſs to be the cauſe of my not obſerving them; for as much as I was at firſt convinc'd; that what I found to be really the *proſtatæ*, was the *Teſtes*. Their being cloſly joyn'd to the *Penis*, and having there a free paſſage for the *Semen*, into the Cells before mentioned; took off my Curioſity to find out what is generally meant by the *Veſiculæ ſeminales*, having ſuſpected no ſuch thing.

Diaphragma. The *Diaphragma* was made of very ſtrong carneous and nervous Fibres.

Thorax. The cavity of the *Thorax* was fill'd by the Lungs and Heart; for the Lungs contrary to what I ever obſerved in other Quadrupeds, *Pulmones.* grew to the *Pleura* as far on each ſide at leaſt (I forgot whether they grew likewiſe to the *Sternum* or not) as the *Cartilages* of the Ribs. For thus far I well remember to have ſeparated them, they were ſo joyned that there was not one place, where you might ſee a natural ſeparation of them. When I parted the Lungs and the *Pleura*, I found that they were joyned by Membranes that might be ſplit at pleaſure: but I could make no clear diſtinction of them into ſeveral Membranes.

By their manner of sticking, they resembled the Lungs of Fowl. By this you may guess how big they were; in other things they agreed with the Lungs of other Animals.

Motus Thoracis.

I suppose that this Animal as well as others, inspired by enlarging the Cavity (if I may so call it) of the *Thorax*; which I suppose to be done principally by the motion of the Ribs from acute, to right Angels, as Dr. *Mayo* well observed. And this I take to be performed by the intercostal, Diaphragm, and Muscles of the abdomen; thus the Cavity of the *Thorax*, being every way enlarged, readily receives the Air forced in impetuously by the weight of the Atmosphære, and I take his expiration to be done by a cessation of the motion of the aforesaid Muscles.

Pericardium.

The *Pericardium* was a strong Membrane, and contained a good quantity of *Serum*.

Cor.

The Heart was of the usual conical figure, and placed as in other Animals: but it was as large as an ordinary Pompion.

Arteria Aorta.

The Vessels belonging to it were proportionable. For the *Aeteria Aorta* (of which I keep a piece though much shrunk) is round eight inches: and the *Vena Cava* was as much larger

larger then the *Arteria*, as it is usually in other Creatures.

By the bigness of the *Venalliaca*, you may perhaps guess better at the *Cava*; The former when slit, did receive and almost cover my four fingers put into it edgewise. *Venalliaca.*

The *Auricles* and *Ventricles* were of a size that was suitable to the bigness of the Heart. The *Valves* were so too, and were the same both in number and figure with those in other Animals. *Cordis auriculæ & valvulæ.*

I open'd the *Arteria Pulmonaris* and cut out the three *Valvulæ Mitrales*, which when I measured, I found to be upwards of six of my inches in length. *Arteria pulmonaris.*

There was no passage to be seen in the *Septum Medium.*

I could not find the bone in the Heart, which *Galen* says he found in *Cæsar*'s Elephant, dissected by his Order at *Rome.*

The *Carotide Arteries* of this Animal was very large, for it readily receiv'd a large cane into it.

The *Æsophagus* after the usual manner was outwardly Muscular, and inwardly Membranous. The *Muscular Fibres* were much thicker than ordinary; for their thickness upon *Æsophagus.*

Maxilla Inferior. on the Membrane was about of an Inch.

The lower Jaw of this Beast, did resemble that of a Hog, the most of any thing.

Lingua. His Tongue was somewhat bigger than that of an Ox, and plac'd after the usuall manner. But this it had peculiar in it, that the passage to the *Ventricle* was through it; for there was a hole near the Root of it, and exactly in the middle of that part. Which hole was the beginning of the *Æsophagus*; there was no communication between this and the passage into the Lungs; contrary to what we may observe in Men, in all Quadrupeds and Fowl that ever I had an opportunity to dissect. For the *Membrana Pituitaria Anterior*, reach'd to the very Root of the Tongue below the *Æsophagus*; and so quite stop'd the passage of the Air into the Mouth. From whence we may conclude, that he could not utter any voice by the mouth, and but little by the trunk or nose.

Membra Pituitaria Anterior. The former *Membrana Pituitaria* had many passages for the *Saliva* usually separated there. There was between the end of the *Proboscis* and the *Larinx* a *Membrana Pituitaria posterior*, which had very many of the same sort of *ductus*.

The

The *Proboſcis* was only a noſe prolong'd, where it was ſeparated from the Forehead, the ſubſtance of it look'd exactly like that of a Neats-tongue ſlit: the fleſh of it being curiouſly interlarded. Where the fire had enter'd upon it, I could diſtinctly perceive three Orders of Fibres; one obliquely and ſpirally deſcending; another ſpirally but croſwiſe deſcending; the third were ſtreight Fibres. Several of the motions of his *Proboſcis* might be perform'd by the aforementioned three diſtinct Series's of Muſcular Fibres. As its contraction, motion up, or down, to the right, or to the left: But by what means he was able at pleaſure, to ſhoot it out from a foot upon any ſuddain occaſion to five foot long; and that with extraordinary force, I cannot clearly perceive. This ſort of motion ſeems to require a particular Theory, being very different from the other motions in the Body of this, and of other Animals; for to me all Muſcular motion ſeems to be by a contraction of Fibres, even when the extention of a Part is deſign'd. In which caſe the Bones of the Parts are drawn, and kept directly one before another, by the contraction of ſome of the Muſcles.

The Proboſcis.

Proboſcidis motus varii.

Now

Now we do not find any part without a Bone, (except this) that is Spontaneously protruded or prolonged, and so continued some time. Some only imagine that the Tongue is moved after this manner, but 'tis certain, that the *Musculus genioglossus* by the help of the *Myloglossus* draws the root of the Tongue, and consequently the *Os Hyoides* forward, that is, to the fore part of the *Maxilla inferior* where they are inserted, and that so it is that the Tongue is protended.

The onely way that I can guess this motion to be performed is by circular Fibres, seeing that there was no Bone towards the end of it, beyond the upper Jaw, which might be a *Maxillamento* to Muscles that might pull it forwards, as the *Genioglossus* does the Tongue, by drawing the Basis of it towards the middle of the *Maxilla inferior*. From the swelling of these Circular Fibres (which I suppose to be in the Trunk) we may expect the lengthening of it, for as much, as each of them (being kept from starting outwards by the aforesaid three orders of Fibres and the Skin) must require much more room than they took up before they were swollen. This contraction of annular Fibres must likewise

make

make the *Proboscis* smaller, as, upon its shooting out, it was obſerv'd always to be.

Now whether *de facto* there were this kind of *Fibres* in it or not, I cannot tell, being hindered by the manager to ſearch for them, leaſt I ſhould make it unfit for preſervation; the Nerves for the acute way that I ſaw them, were *Cartilaginous*.

At the end of the *Proboſcis* there was, of the ſame ſubſtance with it, a little thing that pointed out like a peak, by which the Elephant was obſerv'd to take up very minute Bodies. I can ſay nothing of the ſtructure of this part.

Doubtleſs the Elephants care to preſerve this *Proboſcis* was great, for when we diſjointed him, we found it thruſt near Two Foot in to a very hard ground, upon which account we thought that it had been Burnt, till the Head was divided from the Body, and that we found it kept faſt to the ground by the *Proboſcis*.

The *Aſpera Arteria* was large, and deſtitute of an *Epiglottis*, there being no danger of any things falling into the Lungs, from Eating or Drinking, ſeeing that there was no

Aſpera Arteria.

communication between the *Æſophagus* and it.

The *Cartilagines Aritænoides* made a *glottis*, in length about Three Inches and a Quarter, and in breadth about One and a Half towards the middle; this *Aperture* was ſomewhat Oval.

To the outſide of theſe *Cartilages* I found another grow, which was faſten'd to them, but ſo, as to be capable of motion up and down, by the help of ſome *Muſcles* which were implanted in it. It was ſtrong on both ſides of the *Aſpera Arteria*; but oppoſite to the *Æſophagus*, or on the under ſide, it was very limber. This wanted about Two Inches and a Half of coming round the aforeſaid *Cartilages*, on the upper ſide, or that next to the *Æſophagus*. This ſeem'd to me to ſupply in ſome meaſure the want of an *Epiglottis*; in leſſening the *Glottis* to prevent the creeping in of Animals into the *Thorax*.

Larinx. The *Muſcles* of the *larinx* were very ſtrong. I ſuppoſe, that from the ſtructure of this part, we may gueſs at the reaſon why the Elephant is afraid of a Mouſe, for the Mouſe having room to creep up his *Proboſcis*,

boſcis, might get into his Lungs, and ſo ſtifle him; there being no *Epiglottris* to hinder its paſſage, and the aforeſaid *Cartilage* being hardly ſufficient to ſhut the way againſt it; to avoid this danger, this Creature was obſerv'd always, when he ſlept, to keep his *Proboſcis* ſo cloſe to the ground, that nothing but Air might get in between them. The Wind-pipe of this in other things, was like that of other Animals. *Aſpera Arteria.*

The Eyes were not ſo remarkable for any thing, as for their diſproportion to the reſt of the Body, having but little exceeded a Sheeps Eyes. *Oculi.*

The Ears were very large, and indented round; they were always obſerv'd to hang, except at ſuch times as the Elephant was vex'd, and then they were gather'd like a Purſe, and ſtood forward; at which time he always contracted his *Proboſcis*, and ſo made ready to ſhoot it out, and to punch either Man or Beaſt that anger'd him, and came within his reach. *Aures.*

The Soles of his Feet were plain, and cover'd, not with an Horny ſubſtance, or Hoof like other *Quadrupeds*, but with a Skin (like a Camel, as I am inform'd,) not half *Planæ pedum.*

as thick as that of his Body, but somewhat harder; it might easily be cut with a Knife in any part. By this means these Animals are secur'd from being founder'd in their Travels, in the much heated Sands of their native Countries, which they could not avoid if they were hoof'd; round the outside of this by the ground, there were five little knobs, answering his five Toes; within this skin there was a great quantity of a greasie substance, contain'd in tough Membranes, in little Cells; this was design'd to defend the Toes from wearing.

The Tusks had Cores in them somewhat like Marrow, but were more compact, and seem'd to have some mixture of *Glanduls* in them.

Dura & pia mater. When I saw'd the Skull I found a very strong *dura mater*; and a *pia mater* that might without being torn, be separated in many places, from the substance of the Brain; *Cerebrum.* the Brains were much discolour'd, and very tender withal, and therefore could not be taken out entire; and so they were very unfit for Observations.

Ejus pars corticalis. The *Pars Corticalis* of the *Cerebrum* seem'd to be whiter than ordinary; and the *Gyri* more regular than in Men. The

The *Cerebellum* was like that of a Man, only that it was bigger; both it and the *Cerebrum* weigh'd Ten Pounds. *Cerebellum*

If I forget not, I saw the Ten Pair of *Nerves*, as Doctor *Willis* describes them, and can say nothing in particular of them, but that they were very large.

The outward Tabula

I preserv'd a piece of one of the *Nerves* of the *Os Sacrum*, which was flattish and but little smaller than a Bulls Pizle. Although I cannot certainly tell, whether that part of the *Nerve* which I prescrib'd, was taken from the *Femur*, where the coalition of Four or Five *Nerves*, proceeding from the *Os Sacrum*, is usually found, or not; and consequently cannot so probably guess at the size of the other *Nerves*, as otherwise I might; yet this may shew, that the *Nerves* were proportionable to the other parts of this Animal.

The Skeleton is better expres'd by a Plate well Engrav'd, than by any description whatsoever, and therefore, if you design to make this Publick, I desire you would employ one to take the Icon of it; you may find it with Mr. *Overton* a Merchant in *Lime-street London*. I shall not trouble you or my self with a tedious

of his description of every Bone; but shall in short give you the few Notes I thought convenient to take, before a Copper Plate of the Elephant might be had, which may a little inform you, in case this be not thought worth Publishing.

Cranium. The outward Table of the *Cranium* was very thin, and fragile; between this and the inner, which was not altogether so brittle, there was nothing but a great number of Cells, (which if I forget not) were for the most part Triangular; these were lin'd with thin Membranes, in which were many Blood Vessels curiously branch'd; these Cells were made of thin Plates of Bone.

The greatest distance between the outward and inner Table, was Seven Inches, and the least, Four; the intermedial were the most common; this I would have understood of that part of the Skull which I Saw'd for the taking of the Brains. In this place the Head was from outside to outside, Twenty Inches and Three Quarters.

The whole *Cranium* was so brittle and thin, that without a plate of Iron nail'd in the Roof of the Mouth, in which the Iron rod that ran through the *Vertebræ* of the *Dorsum*

and

and Neck was fasten'd, we could not joyn the Head to the Body without a manifest danger of its being torn to pieces by its own weight. If the space between the Tables had been as solid in the Skull of the Elephant as it is in those of other Animals, the weight of the Head would be too great, for even the Elephant himself to bear. And this may in some measure appear from the weight of the *Maxilla inferior*, which was but small in respect of the other Bones of the Head. This I am told weigh'd sixty pound, or near upon it. I suppose therefore, that the aforesaid Cells were form'd to obviate that great inconveniency, that is, the Heads being too heavy for the Body.

The length of each of the Tuskes was (as *Dentes.* I have been inform'd) three foot and a half. When I search'd for them I found one of them burnt to within less than a foot of the upper Jaw, in which they both grew. The other was broken off somewhat longer; they were bent towards one another, and croſs'd each other near their extremities. The Elephant was observed to feed himself with his *Promuscis*, sometimes thrust through the space made by the arch'd Teeth: at other

times

times by prolonging of it beyond their place of crossing, and then turning it inwards; and at several times by winding of it along the outside of each of the Tusks. This might Both these Teeth reach'd into the upper Jaw, as far as the Sockets for the Eyes; from which they were divided only by thin shells of Bone. These help'd to keep the formerly mention'd Cords within the Teeth.

There was, besides the Tusks only Four Teeth in each Jaw, two in every side.

The length of each of the inner Teeth of the lower Jaw, was about Six Inches and a Half; but the outward of the same Jaw, was only One and Three Quarters long.

The length of the hinder Tooth in the right upper Jaw, was Four Inches; but that of the opposite, was but Three Inches; the Two outward Teeth of the upper Jaw, were somewhat longer than those of the under; the greatest breadth of the Teeth, was Two Inches and Three Quarters; and the least, about an Inch; the breadth of the Teeth of both Jaws was equal; the height of the Teeth above the Gums, was about an Inch and $\frac{3}{4}$; these Eight Teeth were *Molares*, and so he had no *Incisores*.

The

The length of the *Maxilla inferior* was 21 Inches and ½, and the bredth, that is, from the outside of one of the *proceſſus condylodes* to the outside of the other, was 16 Inches and a half. *Maxilla inferior.*

The *Vertebræ* of the *Collum* were 7, those of the *Dorſum* were 20. To each of the latter there was a pair of Ribs, the *Vertebra Lumborum* were only 3. those of the *Os Sacrum* (which are more properly diviſions than *Vertebræ*) were ſix, a good part of the Tail was burnt, and I could not therefore find out the number of Joynts in it. *Vertebræ colli dorſi.* *Lumborum oſſis Sacri.*

The *Proceſſus tranſverſales ac ſpinæ, dorſi & colli* were diſtinct Bones from their *Vertebræ*, and joyn'd to them by *ſutures.* *Proceſſus tranſverſales & ſpinæ.*

The *Ulna* and *Radius* did croſs one another ſo, as that the former came from the back part of the *Os humeri* its proper and uſual place, and was faſten'd by its other end, to the fore part of the *Carpus*, and the latter went contrarywiſe; this poſture of theſe Bones is unuſual, and ſeems to add ſtrength to that part. *Ulna.* *Radius.*

The Back was arch'd like that of a Hog, which Figure contributes the moſt of any to the ſtrength of it.

I ſhall give you no further trouble, onely

desire you would satisfie the R. S. that I preserv'd most of the parts, that were not much defac'd by the Fire, nor likely to perish suddainly; till I had leasure to examine them carefully. And in the mean time, I did what I could to inform my self in the Anatomy of those parts which were more or less alter'd by the heat, and were most subject to corruption. And to convince them of this Truth, I desire that you assure them, that I have some parts of the Elephant at this time, which I preserv'd then; and that as oft as I thought fit, I had the use of those parts which were preserv'd, and sent away with the Skeleton; and that so it was that I was able to give even this imperfect account of the Structure of that Creature; this favour I desire from you, least any of them that reads the beginning of this Letter, should believe me unfaithful in relating the matter of fact, when upon the perusal of the remainder, they may find more then possibly they expected; their compliance herein, and kind acceptance of this, may encourage me to present you with other things of this nature. Sir,

Trinity College,
May 12*th*, 1682.

Your most Faithful, and
most Obedient Servant,

A. M.